

The Stardust Sample Return Capsule reentry observing campaign

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The entry of probes into the atmosphere of a planet offer an opportunity to study the physics of reentry, the physical processes in natural meteors, physical properties of that atmosphere, and the performance of thermal protection materials. We will describe a N.E.S.C. and E.M.S.D. sponsored observing campaign to study the reentry of the STARDUST sample return capsule in Earth's own atmosphere on 2006 January 15. The probe returned on a cometary orbit from a visit to comet 81P/Wild 2, with a sample of cometary dust collected during a flyby. Because the probe had to match the comet orbit, the entry in Earth's atmosphere was the fastest on record, at a speed of 12.8 km/s (at 135 km altitude), comparable to natural meteoroids. The thermal protection material used was a Phenol-Impregnated Carbon Ablator (PICA), developed for the purpose of such fast reentry at NASA Ames Research Center. An observing campaign was organized to deploy an array of remote sensing instruments onboard the NASA DC-8 Airborne Laboratory, which provided an airborne platform above clouds and weather. The campaign proceeded much as planned and the results are now being analyzed. The presentation will focus on the anticipated signatures during the reentry that will be used to study the surface temperature, intensity of shock radiation, and the ablation process. Some preliminary results will be presented, to be discussed at the 2nd *Workshop on Reentry Emission Signatures* at the SETI Institute in Mountain View, CA, on July 6-7 (<http://reentry.arc.nasa.gov>).